

# Curriculum Vitae of Christine E. King

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Department of Biomedical Engineering  
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## Education

Doctorate of Philosophy in Biomedical Engineering – Currently enrolled  
**UNIVERSITY OF CALIFORNIA, IRVINE**, Irvine, CA

*Advanced to Candidacy*

Thesis: *Towards the Development of High-Performance Electroencephalogram (EEG) Based Brain-Computer Interface (BCI) Systems*

Advisor: Professor Zoran Nenadic

Master of Science in Biomedical Engineering - September, 2010

**UNIVERSITY OF CALIFORNIA, IRVINE**, Irvine, CA

Advisor: Professor Zoran Nenadic

Master of Science in Mechanical Engineering – May, 2009

**MANHATTAN COLLEGE**, Riverdale, NY

Thesis: *Redundant Manipulator for Power Wheelchair Used by BCI Unit*

Advisor: Professor Reza Jazar

Bachelor of Science in Mechanical Engineering, Magna Cum Laude – May, 2008

**MANHATTAN COLLEGE**, Riverdale, NY

Minor in Mathematics

Regent's Diploma - June, 2004

**SUFFERN HIGH SCHOOL**, Suffern, NY

Completed high school in three years

## Professional Experience

**UNIVERSITY OF CALIFORNIA, IRVINE**, Irvine, CA

*Tutor for the Graduate Resource Center*

- Tutored writing for fellowships, grants, theses, and other technical reports in engineering and all other graduate fields, June 2011 – January 2013

*Teaching Assistant in Biomedical Engineering Department*

- Taught EEG Lab for Biomedical Engineering Laboratory, March – June 2011
- Assisted in teaching Organ Transport Systems, January - March 2011

**HRL LABORATORIES, LLC.**, Malibu, CA

*Intern in the Information Systems Sciences Laboratory*

- Designed an electroencephalogram based brain-computer interface driven virtual reality car using imagination of walking, June – August 2012
- Researched cognitive workload for cognitive threat detection warning system that used rapid serial visual discrimination, June – August 2012

**LUCIUS PITKIN, INC.**, New York, NY

*Intern for Con Edison*

- Conducted experiments on water hammer, May – August 2009

**MANHATTAN COLLEGE**, Riverdale, NY

*Graduate Assistant in Mechanical Engineering Department*

- Assisted in teaching Thermal-Fluids Laboratory, January – May 2009
- Taught Manufacturing Laboratory, January – May 2008

*Manhattan College Writing Center*

- Math and Engineering Tutor, September 2006 – May 2008

*Undergraduate Research*

- Research and analysis conducted on stresses in willow trees using IDEAS with advisors Dr. Zella Kahn-Jetter & Dr. Evans, September 2006 – May 2008
- Used Labview to analyze and test baby dummies for Shaken Baby Syndrome research with Dr. Graham Walker, January - May 2008
- Designed and built a prototype of a device to assist wheelchair users over curbs with advisor Dr. Bahman Litkouhi, August - January 2007
- Designed an experiment to test an unknown material using emissivity and radiation with advisor Dr. Mohammad Naraghi, August - January 2007

**RYAN CONSULTING ENGINEERS**, New York, NY

*Design engineer in HVAC*

- Used AutoCad to draft electrical, plumbing, HVAC, fire alarm, and asbestos design, December 2007 – September 2008

**ROYAL NATIONAL ORTHOPEDICS HOSPITAL**, Stanmore, England

*Intern in ASPIRE Centre of Orthopedics*

- Analyzed wheelchair propulsion project, created finite element analysis on femur, tested force plate for spinal cord injury patients, May – August 2007

**ROCKLAND COUNTY AMERICORPS**, New City, NY

*AmeriCorps Member*

- Assisted in building an ADA compliant trail along Appalachian Trail, May – August 2006

**RICARDO CONSULTING ENGINEERS**, Shoreham-by-Sea, West-Sussex, England

*Intern in Diesel Development Department*

- Created cost estimation database for manufacturing parts of engines, researched oil data for diesel engines, experimented with engines for reasons behind failure in a test bed, May – August 2005

**Research  
Interests**

Brain-computer interface (BCI) systems, neural engineering, neuroscience, robotics, rehabilitation, assistive devices, control systems, biomedical signal processing, electroencephalography (EEG), electrocorticography (ECoG), machine learning

**Fellowships  
and Awards**

Travel Award for the BMBI Workshop at the IEEE EMBC'12 Conference, 2012  
The Brother Aubert Medal for Mechanical Engineering, 2008  
Presidential Scholarship, LaSallian Honor Society, 2004 - 2008  
Honors Enrichment Program, 2004 - 2008  
Pi Tau Sigma, Mechanical Engineering Honors Chapter, 2004 - 2008

Epsilon Sigma Pi Honors Society, 2004 - 2008  
Tau Beta Pi Engineering Honors Society, 2004 - 2008

## Professional Memberships

The Institute of Electrical and Electronics Engineers (IEEE), IEEE Engineering in Medicine and Biology Society (EMBS), American Society of Mechanical Engineers (ASME), Rehabilitation Engineering and Assistive Device Technology Society of North America (RESNA)

## University Service

### UNIVERSITY OF CALIFORNIA, IRVINE

Writing Tutor for Graduate Resource Center, 2011 - 2013  
Backup Housing Assistant for Palo Verde Housing Community, 2011  
Teaching Assistant for Biomedical Engineering Department, 2010 - 2011  
Secretary for IEEE EMBS Society, 2010 - Present

### MANHATTAN COLLEGE

Graduate Assistant for Mechanical Engineering Department, 2008 - 2009  
Math and Engineering Tutor for Manhattan College Writing Center, 2006 - 2008  
Mechanical Engineering Student Advisory Committee, Member, 2006 - 2008

## Volunteer Work

Rocket Science Tutors – 2010 – Present

### ROCKET SCIENCE TUTORS at McFadden and MacArthur Intermediate School, Santa Ana, CA

- Tutored 12-13 year olds science in after school program and several other outreach program days
- Performed outreach demos at UC Irvine, Youth Leadership Summit in Santa Ana, CA, at the Boys and Girls Club of America in Santa Ana, CA, and at Century High School in Santa Ana, CA
- Coordinator: Nino Polizzi

Outreach at UC Irvine – 2009 – Present

### UC IRVINE, Irvine, CA

- Outreach demos of P300 spelling device and anthropomorphic robotic arm for middle school, high school, and community college students
- Coordinator: Debra Mauzy-Melitz

Volunteer at Helen Hayes Hospital - 2003 – 2008

### HELEN HAYES HOSPITAL, Haverstraw, NY

- Assisted in recreational and cultural activities and data entry in the Gait & Cardiopulmonary Laboratories

## Invited Presentations

[P1] *Mind Controlled Rehabilitation*. UC Irvine Salon TED Talk, Irvine, CA, February 2013.

[P2] *Noninvasive Brain-Computer Interface Driven Hand Orthosis*. IEEE EMBS 2011 Annual Conference, Boston, MA, August 2011.

[P3] *BCI Controlled Walking Simulator for a BCI Driven FES Device*. RESNA 2010 Annual Conference, Las Vegas, NV, June 2010.

## Publications

DISSERTATIONS

[D1] **C.E. King**. Towards the Development of High-Performance Electroencephalogram (EEG) Based Brain-Computer Interface (BCI) Systems. M.S. Thesis in Biomedical Engineering, University of California, Irvine, CA, 2011.

[D2] **C.E. King**. Redundant Robotic Manipulator for Power Wheelchair Used by BCI Unit. M.S. Thesis in Mechanical Engineering, Manhattan College, Riverdale, NY, 2009.

#### JOURNAL ARTICLES

[J1] P.T. Wang, **C.E. King**, A.H. Do, Z. Nenadic. Pushing the communication speed limit of a noninvasive BCI speller, *ArXiv preprint*, 2012.

[J2] A.H. Do, P.T. Wang, **C.E. King**, S.N. Chun, Z. Nenadic. Brain-computer interface controlled robotic gait orthosis: a case report, *J. Neuroeng. Rehabil.*, 2012 (under revision).

[J3] **C.E. King**, P.T. Wang, L.A. Chui, A.H. Do, Z. Nenadic. Operation of a brain-computer interface walking simulator by users with spinal cord injury, *ArXiv preprint*, 2012.

[J4] P.T. Wang, **C.E. King**, L.A. Chui, A.H. Do, and Z. Nenadic. Self-paced brain-computer interface control of ambulation in a virtual reality environment, *ArXiv preprint*, 2012.

[J5] A.H. Do, P.T. Wang, **C.E. King**, S.N. Chun, Z. Nenadic. Brain-computer interface controlled robotic gait orthosis: a case report, *ArXiv preprint*, 2012.

[J6] **C.E. King**, P.T. Wang, L.A. Chui, A.H. Do, Z. Nenadic. Operation of a brain-computer interface walking simulator by users with spinal cord injury, *J. Neuroeng. Rehabil.*, 2012 (under revision).

[J7] P.T. Wang, **C.E. King**, L.A. Chui, A.H. Do, and Z. Nenadic. Self-paced brain-computer interface control of ambulation in a virtual reality environment. *J. Neural Eng.*, vol. 9(5), 2012.

[J8] A.H. Do, P.T. Wang, **C.E. King**, A. Abiri, and Z. Nenadic. Brain-computer interface controlled functional electrical stimulation system for ankle movement. *J. Neuroeng. Rehabil.*, vol. 8(49), 2011 (highly accessed).

[J9] P.T. Wang, **C.E. King**, A.H. Do, and Z. Nenadic. A durable, low-cost electrogoniometer for dynamic measurement of joint trajectories. *Med. Eng. Phys.*, vol. 33(5), pp. 546-552, 2011.

#### CONFERENCE ARTICLES

[C1] A.H. Do, P.T. Wang, **C.E. King**, A. Schombs, S.N. Chun, Z. Nenadic. Brain-computer interface controlled robotic gait orthosis. *In Proc. of the 5<sup>th</sup> International Brain-Computer Interface Meeting*, (accepted), 2013.

[C2] P.T. Wang, **C.E. King**, A. Schombs, J.J. Lin, M. Sazgar, F.P.K Hsu, S.J. Shaw, D.E. Millett, C.Y. Liu, L.A. Chui, Z. Nenadic, A.H. Do. Electrocorticographic gamma band power encodes the velocity of upper extremity movements. *In Proc. of the 5<sup>th</sup> International Brain-Computer Interface Meeting*, (accepted), 2013.

[C3] A.H. Do, P.T. Wang, **C.E. King**, A. Schombs, J.J. Lin, M. Sazgar, F.P.K Hsu, S.J. Shaw, D.E. Millett, C.Y. Liu, A.A. Szymanska, L.A. Chui, Z. Nenadic. Sensitivity and specificity of upper extremity movements decoded from electrocorticogram. *In Proc. of the 35<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, (accepted), 2013.

[C4] A.H. Do, P.T. Wang, **C.E. King**, A. Schombs, S.C. Cramer, Z. Nenadic. Brain-computer interface controlled functional electrical stimulation device for foot drop due to stroke. *In Proc. of the 34<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 6414-6417, 2012.

[C5] C.W. Lee, **C.E. King**, S.-C. Wu, A.L. Swindlehurst, and Z. Nenadic. Signal source localization with tetrodes: Experimental verification. *In Proc. of the 33<sup>rd</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 67-70, 2011.

[C6] **C.E. King**, P.T. Wang, M Mizuta, D. Reinkensmeyer, A.H. Do, S. Moromugi, and Z. Nenadic. Noninvasive brain-computer interface driven hand orthosis. *In Proc. of the 33<sup>rd</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pp. 5786-5789, 2011.

[C7] P.T. Wang, **C.E. King**, L.A. Chui, Z. Nenadic, and A.H. Do. BCI controlled walking simulator for a BCI driven FES device. *In Proc. of RESNA Annual Conference*, Las Vegas, Nevada, June 26-30, 2010.

[C8] **C.E. King**, R. Jazar, and G. Walker. 6R manipulator robotic arm for a power wheelchair used by BCI unit. *11<sup>th</sup> ASME Summer Bioengineering Conference*, Lake Tahoe, CA, 2009.

#### ABSTRACTS

[A1] A.H. Do, P.T. Wang, **C.E. King**, A. Schombs, Z. Nenadic, S.C. Cramer. Brain-computer interface controlled functional electrical stimulation as a novel approach to improving foot-drop after stroke. *In Proc. of the 2013 International Stroke Conference*, Honolulu, HI, 2013 (submitted).

[A2] A.H. Do, P.T. Wang, **C.E. King**, S.N. Chun, Z. Nenadic. Brain-computer interface controlled robotic gait orthosis. *In Proc. of the 34<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society Workshop on Brain-Machine-Body Interfaces*, San Diego, CA, 2012.

[A3] P.T. Wang, **C.E. King**, A.H. Do, Z. Nenadic. Breaking the communication speed limit: a high-performance noninvasive BCI speller. *In Proc. of the 34<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society Workshop on Brain-Machine-Body Interfaces*, San Diego, CA, 2012.

[A4] A.H. Do, P.T. Wang, A. Abiri, **C.E. King**, and Z. Nenadic. Brain-computer interface control of functional electrical stimulation to restore foot dorsiflexion. *The 1<sup>st</sup> UC Irvine School of Medicine Clinical Basic & Translational Science Festival*, Irvine, CA, 2011.

[A5] A.H. Do, P.T. Wang, A. Abiri, **C.E. King**, and Z. Nenadic. Brain computer interface control of functional electrical stimulation to restore foot dorsiflexion. *The 63<sup>rd</sup> American Academy of Neurology Annual Meeting*, Honolulu, HI, 2011.

[A6] Z. Nenadic, P.T. Wang, **C.E. King**, A.H Do, and L.A. Chui. Asynchronous brain-computer interface control of ambulation simulator. *Soc. Neurosci. Abstr.* 40:294.6, San Diego, CA, 2010.

[A7] **C.E. King**, P.T. Wang, Z. Nenadic, and A.H. Do. BCI controlled walking simulator for a BCI driven FES device. *The 39<sup>th</sup> Neural Interfaces Conference*, Long Beach, CA, 2010.

[A8] A.H Do, P.T. Wang, **C.E. King**, L.A. Chui, and Z. Nenadic. Asynchronous BCI control of walking simulator. *The 4<sup>th</sup> International BCI Meeting*, Asilomar, CA, 2010.

[A9] **C.E. King**, R. Jazar, and G. Walker. 6R manipulator robotic arm for a power wheelchair used by a BCI unit. *4<sup>th</sup> Frontiers in Biomedical Devices Conference & Exhibition (sponsored by ASME Emerging Technologies)*, Irvine, CA, 2009.

#### FEATURED NEWS ARTICLES

[N1] BCI Controls Robotic Leg Orthosis, The O&P EDGE, *OandP.com*, September 7, 2012, [http://www.oandp.com/articles/NEWS\\_2012-09-07\\_01.asp](http://www.oandp.com/articles/NEWS_2012-09-07_01.asp).

[N2] Mind-Controlled Robotic Legs Could Help the Paralyzed Walk (VIDEO), Betsy Isaacson, *The Huffington Post*, September 6, 2012, [http://www.huffingtonpost.com/2012/09/06/mind-controlled-robotic-legs-paralyzed-walk\\_n\\_1862078.html](http://www.huffingtonpost.com/2012/09/06/mind-controlled-robotic-legs-paralyzed-walk_n_1862078.html).

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[N3] Man Walks With Aid of Brain-Controlled Robotic Legs, Tanya Lewis, *Wired Science*, September 5, 2012, <http://www.wired.com/wiredscience/2012/09/brain-controlled-robotic-legs/>.

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[N4] Researchers Tout Progress with Brain-Controlled Robotic Legs, Donald Melanson, *Engadget*, September 4, 2012, <http://www.engadget.com/2012/09/04/researchers-tout-progress-with-brain-controlled-robotic-legs/>.

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[N5] Team Reports Brain-Controlled Ambulation in Robotic Leg Test, Nancy Owano, *Phys.org*, September 4, 2012, <http://phys.org/news/2012-09-team-brain-controlled-ambulation-robotic-leg.html>

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